REMARKS

The Office Action dated December 10, 2007, has been received and carefully noted. The above amendments to the claims, and the following remarks, are submitted as a full and complete response thereto.

By this Response, claims 1-14 have been amended to more particularly point out and distinctly claim the subject matter of the present invention. Claim 15 has been cancelled without prejudice or disclaimer. No new matter has been added and no new issues are raised which require further consideration and/or search. Support for the above amendments is provided in the Specification on at least page 10, paragraph [0053] to page 13, paragraph [0063]. Accordingly, claims 1-14 are currently pending of which claims 1, 7-8, and 11-12 are independent claims.

In view of the above amendments and the following remarks, Applicants respectfully request reconsideration and timely withdrawal of the pending claim rejections for the reasons discussed below.

Claim Rejections under 35 U.S.C. §112, First Paragraph

The Office Action rejected claim 15 under 35 U.S.C. §112, first paragraph, as allegedly failing to comply with the written description requirement. Specifically, the Office Action alleged that the claims contain subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art

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that the inventors, at the time the application was filed, had possession of the claimed invention.

Applicants have cancelled claim 15 without prejudice or disclaimer; therefore, the rejection of claim 15 under 35 U.S.C. §112, first paragraph, is rendered moot.

Therefore, Applicants respectfully request withdrawal of the rejection of claim 15 under 35 U.S.C. §112, first paragraph.

Claim Rejections under 35 U.S.C. §103(a)

Claims 1, 7, 8, 11, and 12

The Office Action rejected claims 1, 7, 8, 11, and 12 under 35 U.S.C. §103(a) as being allegedly unpatentable as obvious over Walton, *et al.* (U.S. Patent Publication No. 2002/0154705) ("Walton") in view of Tirkkonen, *et al.* (PCT Patent Publication No. WO 03/001728) ("Tirkkonen"). Applicants respectfully submit that the claims recite subject matter that is neither disclosed nor suggested in the combination of Walton and Tirkkonen.

Claim 1, upon which claims 2-6 are dependent, recites a method. The method includes constructing layered channel symbols as linear combinations of complex modulation symbols, transmitting the layered channel symbols via at least two transmit paths, and using, when constructing the layered channel symbols, at least a first non-zero coefficient and a second non-zero coefficient in at least one layer when performing a linear combination, wherein a ratio of the first coefficient and the second coefficient is

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not a real number. The method also includes using, for at least one modulation symbol, a first non-zero total power for transmission on a first transmit path of the at least two transmit paths, and a second non-zero total power for transmission on a second transmit path of the at least two transmit paths. The method also includes using, for at least another modulation symbol, the first non-zero total power for transmission on the second transmit path of the at least two transmit paths, and the second non-zero total power for transmission on the first transmit path of the at least two transmit paths. The first and second non-zero total powers are not equal.

Claim 7, upon which claims 9-10 are dependent, recites an apparatus. The apparatus includes antenna means for producing two transmit paths for transmission of a signal, means for modulating the signal to be transmitted into complex modulation symbols, and means for constructing layered channel symbols as linear combinations of the complex modulation symbols. The means for constructing the layered channel symbols includes means for constructing the layered channel symbols by using at least a first non-zero coefficient and a second non-zero coefficient in at least one layer when performing the linear combinations. The ratio of the first and second non-zero coefficients is not a real number. The means for transmitting the layered channel symbols by using, for at least one modulation symbol, a first non-zero total power for transmission on a first transmit path, and a second non-zero total power for transmission on a second transmit path, and for at least another modulation symbol, the first non-zero total power for transmission on the second transmit path, and the second non-zero total

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power for transmission on the first transmit path. The first and second non-zero total powers are not equal.

Claim 8, upon which claims 13 and 14 are dependent, recites an apparatus. The apparatus includes an antenna configured to produce two transmit paths for transmission of a signal, a first modulator configured to modulate the signal to be transmitted into complex modulation symbols, and a second modulator configured to construct layered channel symbols as linear combinations of the complex modulation symbols. The second modulator is further configured to construct the layered channel symbols by using at least a first non-zero coefficient and a second non-zero coefficient in at least one layer when performing the linear combination. The ratio of the first and second non-zero coefficients is not a real number. The second modulator and the antenna are further configured to transmit the layered channel symbols by using, for at least one modulation symbol, a first non-zero total power for transmission on a first transmit path, and a second non-zero total power for transmission on a second transmit path, and for at least another modulation symbol, the first non-zero total power for transmission on the second transmit path, and the second non-zero total power for transmission on the first transmit path. The first and second non-zero total powers are not equal.

Claim 11 recites an apparatus. The apparatus includes an antenna configured to produce two transmit paths for transmission of a signal, a first modulator configured to modulate the signal to be transmitted into complex modulation symbols, and a second modulator configured to construct layered channel symbols as linear combinations of the

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complex modulation symbols. The second modulator is further configured to construct the layered channel symbols by using at least a first non-zero coefficient and a second non-zero coefficient in at least one layer when performing the linear combinations. The ratio of the first and second non-zero coefficients is not a real number. The second modulator and the antenna are further configured to transmit the layered channel symbols by using, for at least one modulation symbol, a first non-zero total power for transmission on a first transmit path, and a second non-zero total power for transmission on a second transmit path, and for at least another modulation symbol, the first non-zero total power for transmission on the second transmit path, and the second non-zero total power for transmission on the first transmit path. The first and second non-zero total powers are not equal.

Claim 12 recites a system. The system includes an antenna configured to produce two transmit paths for transmission of a signal, a first modulator configured to modulate the signal to be transmitted into complex modulation symbols, and a second modulator configured to construct layered channel symbols as linear combinations of the complex modulation symbols. The second modulator is further configured to construct the layered channel symbols by using at least a first non-zero coefficient and a second non-zero coefficient in at least one layer when performing the linear combination. The ratio of the first and second non-zero coefficients is not a real number. The second modulator and the antenna are further configured to transmit the layered channel symbols by using, for at least one modulation symbol, a first non-zero total power for transmission on a first

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transmit path, and a second non-zero total power for transmission on a second transmit path, and for at least another modulation symbol, the first non-zero total power for transmission on the second transmit path, and the second non-zero total power for transmission on the first transmit path. The first and second non-zero total powers are not equal.

As will be discussed below, Walton in view of Tirkkonen fails to disclose or suggest every claim feature recited in claims 1, 7-8, and 11-12, and therefore fails to provide the features of the claims discussed above.

Walton is directed to a transmitter and receiver units for use in a communications system and configurable to provide antenna, frequency, or temporal diversity, or a combination thereof, for transmitted signals (Walton, Abstract; page 1, [paragraph [0012] to page 2, paragraph [0022]).

Tirkonnen is directed to a transmission method and a transmitter including one or more antennas for achieving several antenna patterns for the transmission of a signal and means for receiving complex channel symbols at its input. To achieve a high transmission rate and good resistance to interference, the transmitter is configured to code the complex channel symbols by using orthogonally distributed channel resources into channel symbols such that a channel symbol to be transmitted, using at least one antenna pattern during at least one channel resource unit, is a linear combination of at least three modulation symbols. The transmitter also includes means for transmitting more than T

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complex modulation symbols during T resource units, wherein T is at least 2 (Tirkonnen, Abstract; col. 2, line 18, to col. 4, line 5).

Assuming *arguendo* that the teachings of Walton and the teachings of Tirkonnen could be combined, the combination of Walton in view of Tirkonnen fails to disclose or suggest every feature recited in claims 1, 7-8, and 11-12. Specifically, Walton in view of Tirkonnen fails to disclose or suggest, at least,

> using, when constructing the layered channel symbols, at least a first non-zero coefficient and a second non-zero coefficient in at least one layer when performing a linear combination, wherein a ratio of the first coefficient and the second coefficient is not a real number; using, for at least one modulation symbol, a first non-zero total power for transmission on a first transmit path of the at least two transmit paths, and a second non-zero total power for transmission on a second transmit path of the at least two transmit paths; and using, for at least another modulation symbol, the first non-zero total power for transmission on the second transmit path of the at least two transmit paths, and the second non-zero total power for transmission on the first transmit path of the at least two transmit paths, wherein the first and second non-zero total powers are not equal,

as recited in claim 1, and similarly recited in claims 7-8 and 11-12.

Rather, Walton discloses that power control in a communication system is a closed-loop control mechanism where the power used on some resource is controlled based on measurements. Specifically, Walton discloses that "if the path loss from a particular antenna is great, transmission from this antenna can be reduced or muted" and "less power may be transmitted on the subchannel(s) experiencing the most path loss" (Walton, paragraph [0137]).

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Whereas, the present claims are directed to an open-loop space-time block code. Certain embodiments of the present invention disclose a total average transmission power taking all symbols into account. The total power used to transmit one modulation symbol from a given path is defined at least in paragraph [0053] of the disclosure of the present application. As noted in equation (4), and similarly in equations (5) and (10), the total power (the sum of the average power of all symbols) for each of the antennas/path in all channel uses is $|\mu|^2 + |\nu|^2$. In equations (7) and (10), the sum power is always $\sin(\rho)^2 + \cos(\rho)^2 = 1$. This a consequence of using a unitary matrix (3) to construct a "layer." Therefore, Walton is directed to subject matter non-analogous to the subject matter as previously described and disclosed in the features recited in claim 1, and similarly recited in claims 7-8 and 11-12.

Tirkonnen fails to cure the deficiencies of Walton with respect to the aforementioned claim features. Accordingly, Walton in view of Tirkonnen fails to disclose or suggest every feature recited in claims 1, 7-8, and 11-12.

Therefore, Applicants respectfully request withdrawal the rejections of claims 1, 7-8, and 11-12. Accordingly, Applicants respectfully submit that claims 1, 7-8, and 11-12, and the claims that depend therefrom, are now in condition for allowance.

Claims 2, 9, and 13

The Office Action rejected claims 2, 9, and 13 under 35 U.S.C. §103(a) as being allegedly unpatentable as obvious over Walton in view of Tirkkonen as applied to claims

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1, 7, and 8, and further in view of Sampath (U.S. Patent Publication No. 2003/0043929) ("Sampath"). Applicants respectfully submit that the claims recite subject matter that is neither disclosed nor suggested in the combination of Walton, Tirkkonen, and Sampath.

Walton and Tirkkonen were discussed above. Sampath is directed to a method and system for preprocessing transmit signals in spatial multiplexing and diversity systems that include multiple transmit antennae (Sampath, Abstract; page 2, paragraph [0023] to page 3, paragraph [0031]).

As noted above with respect to claim 1, Walton in view of Tirkonnen fails to disclose or suggest every feature recited in claims 1 and 8. Sampath fails to cure the deficiencies of Walton and Tirkonnen. Specifically, Sampath fails to disclose or suggest, at least,

> using, when constructing the layered channel symbols, at least a first non-zero coefficient and a second non-zero coefficient in at least one layer when performing a linear combination, wherein a ratio of the first coefficient and the second coefficient is not a real number; using, for at least one modulation symbol, a first non-zero total power for transmission on a first transmit path of the at least two transmit paths, and a second non-zero total power for transmission on a second transmit path of the at least two transmit paths; and using, for at least another modulation symbol, the first non-zero total power for transmission on the second transmit path of the at least two transmit paths, and the second non-zero total power for transmission on the first transmit path of the at least two transmit paths, wherein the first and second non-zero total powers are not equal,

as recited in claim 1, and similarly recited in claim 8. Accordingly, Walton in view of Tirkkonen, and further in view of Sampath, fails to disclose or suggest every claim feature recited in claims 1 and 8.

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Claims 2 and 9 depend from claim 1. Claim 13 depends from claim 8. Accordingly, claims 2, 9, and 13 should be allowable for at least their dependency upon an allowable base claim, and for the limitations recited therein.

Therefore, Applicants respectfully request withdrawal the rejections of claims 2, 9, and 13. Accordingly, Applicants respectfully submit that claims 1 and 8, and the claims that depend therefrom, are now in condition for allowance.

Claims 3, 10, 14, and 15

The Office Action rejected claims 3, 10, 14, and 15 under 35 U.S.C. §103(a) as being allegedly unpatentable as obvious over Walton in view of Tirkkonen as applied to claims 1, 7, and 8, and further in view of Lott, et al. (U.S. Patent Publication No. 2004/0120287) ("Lott"). Applicants respectfully submit that the claims recite subject matter that is neither disclosed nor suggested in the combination of Walton, Tirkkonen, and Lott.

Walton and Tirkkonen were discussed above. Lott is directed to a system and method for decreasing delays and thereby improving the performance of data transmissions in wireless communication systems by enabling increased data transmission rates to be selected for a reverse link between an access terminal and an access network (Lott, Abstract; page 2, paragraphs [0012]-[0018]).

As noted above with respect to claim 1, Walton in view of Tirkonnen fails to disclose or suggest every feature recited in claims 1, 7, and 8. Lott fails to cure the

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deficiencies of Walton and Tirkkonen. Specifically, Lott fails to disclose or suggest, at least,

> using, when constructing the layered channel symbols, at least a first non-zero coefficient and a second non-zero coefficient in at least one layer when performing a linear combination, wherein a ratio of the first coefficient and the second coefficient is not a real number; using, for at least one modulation symbol, a first non-zero total power for transmission on a first transmit path of the at least two transmit paths, and a second non-zero total power for transmission on a second transmit path of the at least two transmit paths; and using, for at least another modulation symbol, the first non-zero total power for transmission on the second transmit path of the at least two transmit paths, and the second non-zero total power for transmission on the first transmit path of the at least two transmit paths, wherein the first and second non-zero total powers are not equal,

as recited in claim 1, and similarly recited in claims 7 and 8. Accordingly, Walton in view of Tirkkonen, and further in view of Lott, fails to disclose or suggest every feature recited in claim 1, and similarly recited in claims 7 and 8.

Claim 3 depends from claim 1. Claim 10 depends from claim 7. Claim 14 depends from claim 8. Claim 15 has been cancelled without prejudice or disclaimer. Accordingly, claims 3, 10, and 14 should be allowable for at least their dependency upon an allowable base claim, and for the specific limitations recited therein.

Therefore, Applicants respectfully request withdrawal the rejections of claims 3, 10, and 14-15 under 35 U.S.C. §103(a), and respectfully submit that claim 1 and 7-8, and the claims that depend therefrom, are now in condition for allowance.

Claims 4-6

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The Office Action rejected claims 4-6 under 35 U.S.C. §103(a) as being allegedly unpatentable as obvious over Walton in view of Tirkkonen as applied to claim 1, and further in view of Brailean, *et al.* (U.S. Patent No. 6,002,715) ("Brailean"). Applicants respectfully submit that the claims recite subject matter that is neither disclosed nor suggested in the combination of Walton, Tirkkonen, and Brailean.

Walton and Tirkkonen were discussed above. Brailean is directed to a method for a receiver unit to determine a quality value for a received signal based on symbols with similar absolute voltage levels (Brailean, Abstract; col. 2, lines 25-29).

As noted above with respect to claim 1, Walton in view of Tirkonnen fails to disclose or suggest every feature recited in claim 1. Brailean fails to cure the deficiencies of Walton and Tirkkonen. Specifically, Brailean fails to disclose or suggest, at least,

> using, when constructing the layered channel symbols, at least a first non-zero coefficient and a second non-zero coefficient in at least one layer when performing a linear combination, wherein a ratio of the first coefficient and the second coefficient is not a real number; using, for at least one modulation symbol, a first non-zero total power for transmission on a first transmit path of the at least two transmit paths, and a second non-zero total power for transmission on a second transmit path of the at least two transmit paths; and using, for at least another modulation symbol, the first non-zero total power for transmission on the second transmit path of the at least two transmit paths, and the second non-zero total power for transmission on the first transmit path of the at least two transmit paths, wherein the first and second non-zero total powers are not equal,

as recited in claim 1. Accordingly, Walton in view of Tirkkonen, and further in view of Brailean, fails to disclose or suggest every feature recited in claim 1.

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Claims 4-6 depend from claim 1. Accordingly, claims 4-6 should be allowable for at least their dependency upon an allowable base claim, and for the specific limitations recited therein.

Therefore, Applicants respectfully request withdrawal the rejections of claims 4-6 under 35 U.S.C. §103(a), and respectfully submit that claim 1, and the claims that depend therefrom, are now in condition for allowance.

CONCLUSION

In conclusion, Applicant respectfully submits that Walton, Tirkonnen, Sampath, Lott, Brailean, alone or in combination, fail to disclose or suggest every feature recited in claims 1-14. The distinctions previously noted are more than sufficient to render the claimed invention non-obvious. It is therefore respectfully requested that all of claims 1-14 be allowed, and this present application be passed to issue.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, Applicants' undersigned representative at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

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In the event this paper is not being timely filed, Applicants respectfully petition for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,
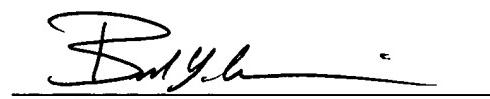
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